

- (a) providing a silicon wafer covered with an insulating film whose main surface is mainly formed of silicon oxide;
- (b) cleaning the surface of said silicon wafer using a processing solution which contains hydrogen peroxide, hydracid fluoride salt, and water, concentration of said hydracid fluoride salt in said processing solution being in a range of about 0.1 to 3 mol/l;
- (c) removing said insulating film after said step (b) thereby to expose the surface of said silicon wafer; and
- (d) subjecting said silicon wafer to a heat-treatment after said step (c) thereby to form a gate oxide film over said silicon wafer.

21. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein the hydracid fluoride salt included in said processing solution is ammonium fluoride.

22. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein the hydracid fluoride salt included in said processing solution is tetraalkyl ammonium fluoride.

23. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein said processing solution includes HF and HF₂ as etching seeds of silicon oxide.

24. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein said processing solution further includes a surfactant.

25. A method of manufacturing a semiconductor integrated circuit device according to claim 20, further comprising a step of cleaning a surface of said silicon wafer during ultrasonic vibration of said processing solution.

26. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein the processing solution has a pH in a range of 6 to 11.

27. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein said processing solution has a temperature as low as 40°C, during the cleaning.

28. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein the insulating film is removed by dipping in a mixed solution of hydrofluoric acid and water.

29. A method of manufacturing a semiconductor integrated circuit device according to claim 20, wherein after the insulating film is removed and prior to subjecting the silicon wafer to the heat-treatment to form the gate oxide film, the silicon wafer is dried.

30. A method of manufacturing a semiconductor integrated circuit device according to claim 29, wherein after the silicon wafer is dried, the silicon wafer is immediately transferred to a chamber for said subjecting said silicon wafer to the heat-treatment.

31. A method of manufacturing a semiconductor integrated circuit device according to claim 30, comprising the further step, after subjecting the silicon wafer to the heat-treatment to form the gate oxide film, of performing another heat-treatment, in an atmosphere of NO or N₂O, to segregate nitrogen at the interface between the gate oxide film and the silicon wafer.

32. A method of manufacturing a semiconductor integrated circuit device according to claim 20, comprising the further step, after subjecting the silicon wafer to the heat-treatment to form the gate oxide film, of performing another heat-treatment, in an atmosphere of NO or N₂O, to segregate nitrogen at the interface between the gate oxide film and the silicon wafer.--
